navigation system. The function selection switches **59** are provided at prescribed locations.

[**0021**] The motor **52** generates a prescribed haptic sense based on an output signal of each of the function selection switches **59**.

[**0022**] A monitor **60** is a liquid crystal display device, for example, and has a display screen. The monitor **60** is provided at a prescribed location and performs display that relates to a desired function based on a control signal for the desired function that is supplied from the controller **58**.

[**0023**] Next, the operation of the above-configured conventional haptic-sense-generation input device will be described. A control signal for generating a haptic sense corresponding to a function that has been selected by manipulating one of the function selection switches **59** is input to the motor **52**. Based on the control signal, the motor **52** generates a prescribed haptic sense, which is transmitted to the manipulation knob **53** that is directly attached to the motor shaft **52***b* of the motor **52**.

[**0024**] A more specific operation of the conventional haptic-sense-generation input device that is performed in tuning in to a radio broadcast will be described below. First, one of the function selection switches **59** that is provided for a function of tuning in to a radio broadcast is manipulated.

[**0025**] In response, the controller **58** inputs, to the motor **52**, a control signal for generating a haptic sense that corresponds to the function of tuning in to a radio broadcast. Based on the control signal, the motor **52** generates a prescribed haptic sense that corresponds to the function of tuning in to a radio broadcast.

[**0026**] Then, when the manipulation knob **53** is manipulated, the haptic sense is transmitted to the manipulation knob **53** that is directly attached to the motor shaft **52***b* of the motor **52** and the names of broadcasting station to tune in to such as NHK first, NHK second, TBS, and Nippon Broadcasting System are displayed on the monitor **60**.

[**0027**] Then, the manipulation knob **53** is rotated clockwise or counterclockwise so as to tune in to one of the above broadcasting stations. While the manipulation knob **53** is rotated, a rotation angle of the manipulation knob **53** is detected by the rotation detecting means that is composed of the photointerrupter **56** and the coding member **54**, whereby the radio receiver can be tuned to the desired broadcasting station.

[**0028**] However, in the conventional haptic-sense-generation input device, the manipulation knob **53** is directly attached to the motor shaft **52***b* of the motor **52** and a haptic sense that is generated by the motor **52** is transmitted to the manipulation knob **53** directly.

[**0029**] Nowadays, haptic-sense-generation input devices capable of generating strong haptic senses are desired. To satisfy this requirement, it is necessary to use a large-sized motor **52** capable of producing high torque. This results in problems that the large-sized motor **52** is costly and makes the haptic-sense-generation input device larger and heavier.

SUMMARY OF THE INVENTION

[**0030**] The present invention has been made to solve the above circumstances, and an object of the invention is therefore to provide a haptic-sense-generation input device that is reduced in size and weight.

[**0031**] A haptic-sense-generation input device according to the invention comprises a manipulation knob; a shaft that holds the manipulation knob and is held rotatably by a bearing; a motor having a motor shaft that is parallel with the shaft; rotation detecting means for detecting a rotation angle of the manipulation knob; a first gear that is attached to the shaft so as to be rotated by the manipulation knob; and a second gear that is attached to the motor shaft and is rotated by the first gear, wherein a haptic sense that is generated by the motor is transmitted to the manipulation knob via the first gear and the second gear.

[**0032**] With this configuration, the motor can be reduced in size and weight as well as in cost while strong haptic senses can be obtained. Further, the haptic-sense-generation input device as a whole can be reduced in size and weight.

[**0033**] In the haptic-sense-generation input device according to the invention, the rotation detecting means comprises a rotator and a rotatable support shaft that holds the rotator and is parallel with the shaft and the motor shaft, and a third gear that is rotated by the first gear to manipulate the rotation detecting means is further provided.

[**0034**] With this configuration, since the third gear is rotated by the first gear, a slip is less likely to occur that in the conventional device in which the rotation detecting means uses a belt; the gear rotation is made reliable and stable.

[**0035**] In the haptic-sense-generation input device according to the invention, the first gear is an internal gear and the second gear and the third gear are engaged with the internal gear.

[**0036**] With this configuration, since the second and third gears having prescribed gear ratios with respect to the first gear are rotated by the first gear, the gear rotation is made stable while the haptic-sense-generation input device is reduced in size.

[**0037**] In the haptic-sense-generation input device according to the invention, the manipulation knob is formed with the first gear that is the internal gear.

[**0038**] With this configuration, the first gear can be formed easily and the cost of the haptic-sense-generation input device can be reduced accordingly.

[**0039**] The haptic-sense-generation input device according to the invention further comprises a fourth gear that is engaged with the internal gear.

[**0040**] With this configuration, since the internal gear is engaged with the second, third, and fourth gears, the internal gear is pulled toward the fourth gear by the fourth gear itself. Therefore, the second and third gears rotate being engaged with the internal gear reliably and hence the internal gear can rotate stably.

[**0041**] In the haptic-sense-generation input device according to the invention, the second gear, the third gear, and the fourth gear are located at the respective apices of an equilateral triangle.

[**0042**] With this configuration, the rotation of the internal gear is made more stable.